

**BRITISH MUSEUM
NATURAL RADIOCARBON MEASUREMENTS XI**

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The following list consists of dates for archaeological samples measured over the period from June 1974 to July 1976. The dates were obtained by liquid scintillation counting of benzene using a Model 3315 Packard Tri-carb Liquid Scintillation Spectrometer linked to a Hewlett Packard 2100A computer system for on-line processing of counting data (Hall & Hewson, 1977). The laboratory procedures used were essentially those outlined in previous lists (see, eg, BM-VIII, R, 1976, v 18, p 16).

Sample materials were pretreated with dilute acid and alkali as appropriate; only the collagen fraction of antler and bone was used for dating.

The dates are expressed in radiocarbon years relative to AD 1950 based on the Libby half-life for ^{14}C of 5570 yr, and are corrected for isotopic fractionation ($\delta^{13}\text{C}$ values are relative to PDB). No corrections have been made for natural ^{14}C variations. The modern reference standard is NBS oxalic acid. Errors quoted with the dates are based on counting statistics alone and are equivalent to ± 1 standard deviation ($\pm 1\sigma$).

Descriptions, comments and references to publications are based on information supplied by the persons who submitted the samples.

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SAMPLE DESCRIPTIONS

ARCHAEOLOGIC SAMPLES

A. British Isles

BM-221. Oakhanger, Selborne, Hampshire **7869 \pm 104**
 $\delta^{13}\text{C} = -25.0\text{‰}$

Charcoal (*Pinus sylvestris* L, id by G W Dimbleby) from Site V, Oakhanger warren, Selborne, Hampshire, England (51° 05' N, 0° 55' W, Natl Grid Ref SU 760350) assoc with Mesolithic industry and settlement site immediately underlying cultivated soil (Rankine, 1952; Rankine *et al*, 1960). Coll ca 1950 by W F Rankine. *Comment*: though poorly stratified, Oakhanger is important site which has yielded large assemblage of Mesolithic flint artifacts now in British Mus colln.

BM-402. Upton Pyne, Devonshire **3336 \pm 53**
 $\delta^{13}\text{C} = -24.7\text{‰}$

Charcoal (*Quercus* sp) from Barrow 248b, 1km N of Upton Pyne, Exeter, Devonshire, England (50° 45' N, 3° 30' W, Natl Grid Ref SX 914990). Sample was in Urn 4 inverted on old ground surface in central

sand core of barrow (Pollard & Russell, 1970). Coll 1967 by Sheila Pollard, Devon Archaeol Soc; subm by Henrietta Miles, Dept Extra-Mural Studies, Univ Exeter. *Comment*: Urn 4 was assoc with urn (no. 3) of Trevisker series (ApSimon & Greenfield, 1972); both were slightly subsequent to primary series Collared Urn inverted in small cist in old ground surface, and approx contemporary with "Wessex biconical" Urn (no. 1) inverted over cremation of infant. Date is 150 to 200 yr earlier than expected (ApSimon, 1976), possibly due to use of large timbers for funeral pyre.

Picken's Hole, Somerset

Collagen from animal bone fragments from Picken's Hole cave and rock shelter site, Crook Peak, Compton Bishop, Mendip, Somerset, England (51° 15' N, 5° 55' W, Natl Grid Ref ST 396550). Coll 1963 and subm by E K Tratman, Univ Bristol Spelaeol Soc, and A M ApSimon, from layers in talus slope containing 2 distinct faunal assemblages; uppermost layer dated (3) contained human remains and stone artifacts (Tratman, 1964).

+ 2600

BM-654. Picken's Hole **34,265**
- 1950

Ref M30, Layer 3, Sample 3A; hyaena, rhinoceros, mammoth layer containing teeth of *Homo* sp, cf *sapiens*; Upper Pleistocene deposit, expected date ca 23,000 to 40,000 BP.

+ 1700

BM-655A. Picken's Hole **26,650**
- 1400

Ref M30, Layer 5, Sample 5(I); lower bone layer dominated by wolf and bear (*Ursus arctos* L) with reindeer, red deer and bovid; interstadial deposit, expected date older than 40,000 BP.

+ 1850

BM-655B. Picken's Hole **27,000**
- 1500
 $\delta^{13}C = -22.5\%$

Ref M30, Layer 5, Sample 5(I); check measurement on BM-655A using fresh sample.

General Comment (AMA & RB): dates are in reverse order relative to apparent stratigraphy and date of ca 27,000 BP for Layer 5 (BM-655A) is much later than expected from faunal and pedologic evidence indicating mild interstadial conditions; other dates from NW Europe indicate open periglacial conditions ca 27,000 BP. Check measurement BM-655B confirms result but sample from Layer 5 was chemically weathered and may have been contaminated; some samples from this layer contained no collagen. Stone artifacts from sub-layer below 3A indicate industry of terminal Middle Palaeolithic facies for which date not later than ca 35,000 BP would be expected. BM-654 agrees with this and with pattern of other available dates for mid last-glaciation (Devensian) interstadials.

BM-729. Cattedown Cave, Devonshire **15,125 ± 390**
 $\delta^{13}C = -24.7\text{‰}$

Collagen from tibia of reindeer (*Rangifer tarandus* L) from Cattedown Cave, Plymouth, Devonshire, England (50° 20' N, 4° 05' W, Natl Grid Ref SX 490537). Tibia (ref CBR 15.6.74/3) was from assoc group of bones representing hind part of single skeleton from late Pleistocene fill. Coll 1974 by B Lewarne; subm by A J Sutcliffe, Dept Palaeontol, British Mus (Nat Hist) as part of program for dating late-glacial and post-glacial mammals in British Isles (R, 1976, v 18, p 30). *Comment* (AJS): date corresponds with time of glacial advance and low sea level inferred from field evidence (Sutcliffe & Lewarne, 1977); human skeletal remains of possible Pleistocene age were found in 1886 in cave filling ca 60m away in same Devonian limestone formation (Worth, 1887; 1888).

Pilsgate, Lincolnshire

Two charcoal samples from Bronze age cremation burial at Barnack Road, Pilsgate, Lincolnshire, England (52° 40' N, 0° 25' W, Natl Grid Ref TF 049069) assoc with Collared Urn and Food Vessel (Pryor, 1974). Coll 1971 and subm by F M M Pryor for Nene Valley Research Comm.

BM-868. Pilsgate **3522 ± 38**
 $\delta^{13}C = -24.6\text{‰}$

BM-869. Pilsgate **3296 ± 50**
 $\delta^{13}C = -22.5\text{‰}$

General Comment: dates generally agree with those previously established for British Bronze age ceramics; their span may well reflect variable composition of pyre material.

Stonehenge Avenue, Amesbury, Wiltshire

Two antlers of red deer (*Cervus elaphus* L) from separate excavations of Stonehenge Avenue, Stonehenge, Amesbury, Wiltshire, England (51° 10' N, 1° 50' W, Natl Grid Ref SU 122422). Sample 1 coll 1973 and subm by G Smith, Dept Environment; Sample 2 coll 1923 by W Hawley and subm 1974 by R J C Atkinson, Dept Archaeol, Univ College, Cardiff, from colln of Salisbury Mus.

BM-1079. Stonehenge Avenue **3020 ± 180**
 $\delta^{13}C = -24.8\text{‰}$

Sample 1. Collagen from antler from lower layer of ditch 55C(5), E end of Avenue (Smith, 1973). *Comment:* cf date, 2750 ± 100 (I-3216) for antler and domestic animal bone from middle of Avenue (Atkinson *et al*, 1976).

BM-1164. Stonehenge Avenue **3678 ± 68**
 $\delta^{13}C = -23.7\text{‰}$

Sample 2. Collagen from antler (Salisbury Mus ref no. 4765) at base of ditch, SW end of NW Avenue. *Comment* (RJCA): date agrees with that for another antler at base of SE ditch NE of Heel Stone, 3720 ± 100

(HAR-2013, unpub), but not with dates for middle and E end of Avenue, 2750 ± 100 (I-3216); 3020 ± 180 (BM-1079, above). It may be inferred that Avenue is of 2 periods of construction.

Gorsey Bigbury, Somerset

Charcoal (mainly *Quercus* sp) and domestic animal bone samples (ref T.186) from Class I henge monument at Gorsey Bigbury, Cheddar, Somerset, England ($51^{\circ} 20' N$, $2^{\circ} 45' W$, Natl Grid Ref ST 485558). Coll 1931-1934 by S J Jones; subm 1973 by A M ApSimon, Dept Archaeol, Univ Southampton. Samples came from Beaker occupation layer in fill of ditch (Jones, 1938).

BM-1086. Gorsey Bigbury **3663 \pm 61**
 $\delta^{13}C = -26.5\%$

Charcoal, ref CH2.

BM-1087. Gorsey Bigbury **3602 \pm 71**
 $\delta^{13}C = -27.8\%$

Charcoal, ref CH7.

BM-1088. Gorsey Bigbury **3800 \pm 74**
 $\delta^{13}C = -26.5\%$

Charcoal, ref CH9.

BM-1089. Gorsey Bigbury **3782 \pm 62**
 $\delta^{13}C = -26.8\%$

Charcoal, ref CH13.

BM-1090. Gorsey Bigbury **3666 \pm 117**
 $\delta^{13}C = -17.1\%$

Collagen separated from animal bone (Sample 1).

BM-1091. Gorsey Bigbury **3606 \pm 67**
 $\delta^{13}C = -22.6\%$

Collagen separated from animal bone (Sample 2).

General Comment (AMA): dates as expected with very good agreement between bone and charcoal; assoc pottery is late Bell Beaker, cf Lanting & van der Waals (1972) "steps" 5 and 6, predicted date ca 3750 to 3500 BP. Range of dates is consistent with 60 to 100 yr occupation estimated on archaeol evidence. Henge was probably constructed ca 200 radiocarbon yr earlier (ApSimon *et al*, 1976).

BM-1097. Grime's Graves, Norfolk **3084 \pm 44**
 $\delta^{13}C = -25.0\%$

Charcoal from surface feature (Trench 10, Layer 5, Sample 26) adjacent to Neolithic flint mine shaft at Grime's Graves, Weeting, Thetford, Norfolk, England ($52^{\circ} 30' N$, $0^{\circ} 40' E$, Natl Grid Ref TL 816898). Coll 1972 and subm by R J Mercer, Dept Environment. For other samples in this series, see R, 1976, v 18, p 32-33; see also Mercer (1976).

BM-1102. Hartmann globe **100.2 ± 0.6 ‰ modern**
 $\delta^{13}C = -23.9\text{‰}$

Wood (probably Ash, *Fraxinus* sp) drilled from sphere of Hartmann terrestrial globe from colln of Natl Maritime Mus, Greenwich, London, England (51° 30' N, 0° 0' E). Subm by A D Baynes-Cope, Research Lab, British Mus. *Comment* (ADB-C): globe is similar to that shown in Holbein's painting "The Ambassadors", AD 1533, and to other globes in Helsinki colln formed in late 19th century by Count Nordenskiöld, founder of modern cartography. Measurement shows unequivocally that mount is modern, ca AD 1890, and further work has since shown that map is also modern and not remounted 16th century map as previously believed (Baynes-Cope, ms in preparation).

Clegyr Boia, Dyfed

Charcoal samples (mainly *Quercus* sp, *Corylus avellana*, and some *Betula alba*, id by H A Hyde) from Clegyr Boia, a hill-fort of Iron age type having previous Neolithic occupation and later Dark age (6th century AD) legendary assoc (Baring-Gould, 1903; Williams, 1952), on St David's peninsula, Dyfed (Pembrokeshire), Wales (51° 50' N, 5° 20' W, Natl Grid Ref SM 737251). Coll 1943 by Audrey Williams, Ancient Monuments Inspectorate and subm 1973 by W F Grimes on behalf of Natl Mus Wales, Cardiff, to date Neolithic occupation and later construction of hill-fort.

BM-1109. Clegyr Boia **2370 ± 29**
 $\delta^{13}C = -26.3\text{‰}$

Sample ref CBa, b, c from Neolithic occupation (hut and midden). *Comment* (WFG): date is unacceptable; samples were stratigraphically earlier than Iron age defences and had unequivocal Neolithic assoc.

BM-1110. Clegyr Boia **1950 ± 116**
 $\delta^{13}C = -20.4\text{‰}$

Sample ref CBd from area of burning contemporary with structure near entrance to hill-fort. *Comment* (WFG): sites of Clegyr Boia type are thought, based on unclear evidence, to range through prehistoric Iron age into Dark age and, to this extent, date is acceptable.

BM-1111. Pond Cairn, Mid-Glamorgan **3506 ± 51**
 $\delta^{13}C = -25.4\text{‰}$

Charcoal (mainly gorse, *Ulex* sp, and *Quercus* sp, id by H A Hyde) from primary Middle Bronze age assoc (Fox, 1938; 1959) in Pond Cairn, Coity, Mid-Glamorgan, Wales (51° 30' N, 3° 30' W, Natl Grid Ref SS 915812). Coll 1937 by Sir Cyril Fox and subm 1973 by W F Grimes, to date Collared Urn accompanying primary burial. *Comment* (WFG): date is acceptable.

BM-1112. Ogmores-by-Sea, Mid-Glamorgan **4659 ± 52**
 $\delta^{13}C = -25.4\text{‰}$

Charcoal from a Late Neolithic occupation layer in sand-dunes on S side of mouth of Ogmores R, Sutton, Ogmores-by-Sea (Pen-y-bont), Mid-

Glamorgan, Wales (51° 30' N, 3° 40' W, Natl Grid Ref SS 863756). Coll ca 1968 by D P Webley and subm 1973 by H N Savory, Natl Mus Wales, Cardiff, to date basal layer of occupation deposit assoc with Peterborough ware. *Comment* (HNS): date agrees with date of 4320 ± 80 (HAR-1140, unpub) for burnt hazel nuts (*Corylus* sp) from upper part of same layer assoc with Cord-impressed ware (Webley, 1976, p 35, note 44); both dates are slightly earlier than expected.

Nant Maden, Powys

Charcoal samples from Early Bronze age round cairn at Nant Maden, Cwm Cadlan, Penderyn, Powys, Wales (51° 45' N, 3° 30' W, Natl Grid Ref SN 971105). Coll ca 1961 by D P Webley and subm 1973 by H N Savory, to date primary and secondary structures within 3-period cairn.

BM-1113. Nant Maden

3518 ± 51

$\delta^{13}C = -20.5\%$

Sample ref 3. Charcoal from surface of D-shaped enclosure forming primary (Beaker) structure of cairn.

BM-1114. Nant Maden

3475 ± 36

$\delta^{13}C = -26.4\%$

Sample ref 4. Charcoal assoc with cremation deposit and sherds of Collared Urn inserted in wall of ruined D-shaped primary structure before secondary cairn built.

General Comment (HNS): dates are in right order and quite acceptable.

BM-1118. Twyn-y-Gaer, Gwent

2236 ± 38

$\delta^{13}C = -25.4\%$

Charcoal (ref CS5) from last rebuilding of fence delimiting annexe of Twyn-y-Gaer hill-fort, Cwmyoy, Gwent, Wales (51° 55' N, 3° 30' W, Natl Grid Ref SO 294219). Coll ca 1970 by L A Probert and subm 1973 by H N Savory, to fix date of Period I of hill-fort (Probert, 1976).

BM-1119. Portsdown, Hampshire

3009 ± 57

$\delta^{13}C = -22.6\%$

Collagen from post-cranial bones of human skeleton (ref 541/1972) from Southwick Hill crossroads, Portsdown, Portsmouth, Hampshire, England (50° 50' N, 1° 05' W, Natl Grid Ref SU 648066). Crouched burial of female of 15-17 yr in shallow grave, assoc with double-ended cup of "Vase-support" type (Piggott, 1938). Coll 1972 and subm by D J Rudkin, Portsmouth City Mus. *Comment*: although later than expected, result is comparable with dates for Wessex culture assemblages from Earls Barton, BM-680, 3169 ± 51; BM-681, 3214 ± 64; Hove, BM-682, 3189 ± 36, and Edmondsham, BM-708, 3069 ± 45 (R, 1976, v 18, p 26, 29).

Thatcham, Berkshire

Two wood samples (*Salix* sp) from Avenell's Cottages Sec, Thatcham, Berkshire, England (51° 20' N, 1° 15' W, Natl Grid Ref SU 526656). Sam-

ples were dated as part of Kennet Valley Research Committee program for interdisciplinary study of Mesolithic sites. Coll 1975 and subm by G H Cheetham, Dept Geog, Univ Reading.

BM-1135. Thatcham **8929 ± 71**
 $\delta^{13}C = -25.5\text{‰}$

Sample TS/A from 1.7m depth in peat, 10cm above junction of peat and clay. Cellulose fraction only.

BM-1136. Thatcham **9223 ± 100**
 $\delta^{13}C = -27.8\text{‰}$

Sample TS/B from 1.8m depth at junction of peat and clay. Whole wood; pretreated with acid and alkali.

General Comment: samples date depositional and palaeoecologic changes in region with important series of Mesolithic sites (Churchill, 1962; From, 1976; Wymer, 1962); terrestrial mollusks in deposits underlying samples show transitions conforming with scheme proposed by Kerney (1977) for zonation of late-glacial and postglacial deposits.

Graveney, Kent

Two wood samples (*Quercus* sp) from boat found during cutting of drainage dyke at Graveney Marsh, 1.6km NW Graveney, Kent, England (51° 20' N, 1° 0' E, Natl Grid Ref TR 065638). Coll 1970 and subm by J M Fletcher, Research Lab Archaeol, Univ Oxford.

BM-1137. Graveney **1178 ± 38**
 $\delta^{13}C = -25.9\text{‰}$

Wood from timbers of boat (Strake S3D).

BM-1138. Graveney **1095 ± 37**
 $\delta^{13}C = -25.3\text{‰}$

Wood from timbers of boat (Strake S3D).

General Comment (RB): when these dates are corrected for "growth allowance" of timber (yr between known felling date and rings analyzed) and for natural ^{13}C variations, and taken with other dates in series (R, 1976, v 18, p 24-25) date of AD 944 ± 30 for construction of boat is obtained (Burleigh, 1978; Fenwick, 1972; 1978; Fletcher *et al*, 1978).

BM-1148. Bratton Down, Devonshire **2832 ± 42**
 $\delta^{13}C = -24.8\text{‰}$

Charcoal (ref BRD/46) from cremation burial in barrow at Bratton Down, Bratton Fleming, Devonshire, England (51° 10' N, 3° 45' W, Natl Grid Ref SS 662377) assoc with sherds of Trevisker Style IV vessel. Coll 1973 and subm by Henrietta Miles, Dept Extra-Mural Studies, Univ Exeter. *Comment (HM):* result gives 1st indication of dating of late Trevisker series pottery and suggests barrow building in region continued into 1st millennium BC.

Milfield, Northumberland

Two charcoal samples from ditch fill of henge monument at Milfield North, 0.5km N of Milfield village, Wooler, Northumberland, England (55° 35' N, 2° 10' W, Natl Grid Ref NT 934349). Coll 1975 and subm by A F Harding, Dept Archaeol, Univ Durham.

BM-1149. Milfield North **3774 ± 39**
 $\delta^{13}C = -25.8\text{‰}$

Sample 6 from burnt layer in middle silt of ditch (ca 50cm above Sample 15, BM-1150), SW sec, beside S entrance.

BM-1150. Milfield North **3801 ± 62**
 $\delta^{13}C = -24.7\text{‰}$

Sample 15 from primary silt of ditch, SW sec, beside S entrance.

General Comment (AFH): closeness of dates suggests rapid infilling of ditch; no firm cultural assoc with ditch fill but large grave-pit in ditch contained sherds similar in type to pottery known in SW Scotland as "Beaker-Food Vessel". Charcoal from a 2nd grave-pit containing an Early Bronze age globular vessel was dated to 3750 ± 80 (HAR-1199, unpub).

Breiddin, Powys

Four charcoal samples from occupation deposits at Breiddin hill-fort, Powys, Wales (52° 35' N, 3° 0' W, Natl Grid Ref SJ 292144). Coll 1975 and subm by C R Musson, Clywd-Powys Archaeol Trust. See R, 1976, v 18, p 34-35 for other dates in this series.

BM-1158. Breiddin **2151 ± 31**
 $\delta^{13}C = -25.0\text{‰}$

Sample BO4A from occupation layer behind rampart.

BM-1159. Breiddin **2142 ± 31**
 $\delta^{13}C = -24.3\text{‰}$

Sample BO4C from occupation deposit behind rampart.

BM-1160. Breiddin **2108 ± 31**
 $\delta^{13}C = -25.4\text{‰}$

Sample BO4E from floor of roundhouse behind rampart.

BM-1161. Breiddin **2141 ± 28**
 $\delta^{13}C = -25.6\text{‰}$

Sample BO4G from refuse outside roundhouse behind rampart.

General Comment (CRM): deposits had accumulated behind rampart with *terminus post quem* of 2220 ± 90 (QL-1080, unpub); stratigraphic sequence was BM-1160, -1161, -1158, -1159 (BM-1160 earliest) for which individual dates are not distinguishable.

*B. Ecuador***Southern Sierra series**

Charcoal samples from sites in Southern Sierra region of Ecuador (ca 3° S, 80° W). Coll 1972-1974 and subm by W Bray, Inst Archaeol, Univ

London, and Elizabeth Carmichael, *Mus Mankind*, London. Dates help determine relationship between early pottery sites in coastal and Sierra regions. See R, 1977, v 19, p 148-149 for other dates in this series.

BM-905. El Carmen (lower)	2446 ± 50 $\delta^{13}C = -24.2\text{‰}$
Sample ref 8C4.	
BM-906. Chaullabamba	2800 ± 48 $\delta^{13}C = -25.3\text{‰}$
Sample ref 14 (Conejero).	
BM-907. Chaullabamba	2964 ± 50 $\delta^{13}C = -19.1\text{‰}$
Sample ref 14B14ii.	
BM-908. Chaullabamba	2784 ± 50 $\delta^{13}C = -23.0\text{‰}$
Sample ref 14B29.	
BM-909. Cerro Narrio	904 ± 59 $\delta^{13}C = -22.6\text{‰}$
Sample ref 12C1a.	
BM-910. Cahuashin Chico	Modern $\delta^{13}C = -24.0\text{‰}$
Sample ref 7B.	
BM-911. Las Juntas	1970 ± 46 $\delta^{13}C = -24.7\text{‰}$
Sample ref 58, 20cm (5.9.75).	
BM-912. Villa Jubones	3181 ± 53 $\delta^{13}C = -21.5\text{‰}$
Sample ref 56, Unit 1, Level 9.	
BM-914. Sumay Pamba	2348 ± 52 $\delta^{13}C = -26.1\text{‰}$
Benigno Malo excavation.	

General Comment (EC): dates so far obtained for sites between Cuenca basin and Jubones R accord well with archaeol evidence (Grijalva, 1975) and confirm anticipated relationship with Chorrera phase of coastal Ecuador. BM-899 (R, 1977, v 19, p 149) and BM-914 above, were from sites S of Jubones R with distinct sherd assemblages. BM-909 from much disturbed site of Cerro Narrio was assoc with coarse pottery from separate location than BM-896 (R, 1977, v 19, p 149).

C. Egypt

BM-1139. Lentils	2112 ± 48 $\delta^{13}C = -20.4\text{‰}$
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Lentil seeds (*Lens culinaris*) from colln of Dept Egyptian Antiquities, British Mus. Coll in Egypt (ca 25° N, 30° E) ca 1834 by J Sams; exact

provenience unknown. Seeds were infested in antiquity by beetles of family *Bruchidae*; recent examination showed these were of previously unknown sp; sample was dated for this reason, as direct historical evidence was lacking (Burleigh & Southgate, 1975).

D. Ethiopia

BM-1153. Gobedra

2806 ± 53

$\delta^{13}C = -21.1\%$

Collagen from comminuted bone fragments (ref GBD/B/2a) from Gobedra rock-shelter, Gobedra hill, 6km W of Axum, Tigre prov, Ethiopia (14° 10' N, 38° 45' E) assoc with final phase of local "Late Stone Age" microlithic industry. Coll 1974 and subm by D W Phillipson, British Inst in E Africa, Nairobi. *Comment*: date is as expected for final phase of pottery-assoc microlithic industry (Phillipson, 1977).

E. Greece

BM-1074. Kouros figure

3817 ± 140

$\delta^{13}C = -13.3\%$

Wood (*Acacia* sp, possibly *A negevensis*, *A seyal* or *A tortilis*, id by M Y Stant, Royal Botanic Gardens, Kew) from battered kouros human figure of 1/3-1/2 life-size, reputedly found on Aegean island of Samos (37° 45' N, 26° 50' E) ca 1939. Subm by A W Johnston, Dept Classical Archaeol, Univ College London. *Comment* (AWJ): figure was expected to be either Greek original of ca 475 BC or modern copy; early date and wood id suggest Egyptian XII Dynasty origin with possible Greek re-working; conflict of stylistic and other evidence precludes more definite attribution (Johnston, 1975).

Servia

Charcoal samples from Neolithic and Early Bronze age levels at Servia, W Macedonia, Greece (40° 10' N, 22° 0' E). Coll 1972-1973 and subm by Cressida Ridley, British School Archaeol at Athens and R N L B Hubbard, Inst Archaeol, Univ London.

BM-1103. Servia

6880 ± 49

$\delta^{13}C = -25.2\%$

Sample 8; middle phase of Middle Neolithic (Sesklo).

BM-1104. Servia

6747 ± 51

$\delta^{13}C = -25.1\%$

Sample 9; middle phase of Middle Neolithic (Sesklo).

BM-1105. Servia

6706 ± 53

$\delta^{13}C = -24.1\%$

Sample 13; earliest Late Neolithic (Larissa).

BM-1106. Servia

6690 ± 83

$\delta^{13}C = -23.0\%$

Sample 21; early phase of Middle Neolithic (Sesklo).

BM-1107. Serbia **6606 ± 55**
 $\delta^{13}C = -24.7\text{‰}$

Sample 22; later phase of Late Neolithic (Larissa).

BM-1108. Serbia **3694 ± 98**
 $\delta^{13}C = -23.8\text{‰}$

Sample 23; Early Bronze Age II.

BM-1157. Serbia-Varytimidhes **6905 ± 87**
 $\delta^{13}C = -24.5\text{‰}$

Sample 121; from fill of pit sealed by late Early Neolithic courtyard level.

General Comment (RNLBH): dates for Middle Neolithic (BM-1103, -1104, -1106) are generally acceptable for Sesklo culture but do not conform with stratigraphy at Serbia (Rhomipoulou & Ridley, 1972; 1973; 1974). Because of complicated pattern of post-holes, some dated material may not have originated in levels from which it was recovered. Late Neolithic dates (BM-1105, -1107) are several hundred yr older than expected; dates for Early Neolithic (BM-1157) and Early Bronze age (BM-1108) are ca 500 and 900 yr younger than expected. More Middle and Late Neolithic samples from 1973 excavations will be dated in attempt to clarify these results.

F. Israel

Timna

Charcoal samples from smelting areas and furnaces in Timna Valley, Wadi Arabah, ca 30km N of Elat, Gulf of Aquaba, Israel (34° 55' N, 29° 45' E). Coll ca 1974 (except BM-1163, coll 1960) and subm by M F Barbetti, Res Lab Archaeol, Univ Oxford, and B Rothenberg, Dir, Arabah Expedition (Rothenberg, 1972).

BM-1115. Timna **2840 ± 51**
 $\delta^{13}C = -23.8\text{‰}$

Timna-2, Area E, Pit B, Sample 590; Ramesside smelting area and camp, ca 13-12th century BC.

BM-1116. Timna **1945 ± 309**
 $\delta^{13}C = -25.0\text{‰}$

Timna-39, sample from wall of Chalcolithic furnace of 4th millennium BC (Rothenberg *et al*, 1978).

BM-1117. Timna **2779 ± 55**
 $\delta^{13}C = -13.8\text{‰}$

Timna-200, Sample 589; Nabataean melting furnace, 1st century AD.

BM-1162. Timna **2480 ± 35**
 $\delta^{13}C = -24.6\text{‰}$

Timna-30, Area C5, Stratum I, Sample 632, inclusions in slag; 12th century BC or later.

BM-1163. Wadi Amram**1240 ± 36** $\delta^{13}C = -24.1\%$

Site 33, Sample 630, inclusions in slag; surface find, coll 1960, from slag heap incorporating material of Early Iron age, ca 12th century BC, and early Arabic date.

General Comment: calibrated date for BM-1115, ca 1100 BC, is consistent with archaeol evidence. BM-1117 came from apparent Nabataean furnace assoc with pottery of 1st century AD but immediately overlying temple of 12th century BC with which calibrated date agrees; furnace may not be assoc with pottery or charcoal may be from lower level. BM-1116 is also apparently invalidated by misassoc. BM-1162 provides date for Stratum I at Site 30; BM-1163 dates late use of slag heap at Site 33.

*G. Poland***BM-1128. Saspow****5046 ± 102** $\delta^{13}C = -25.7\%$

Charcoal from hearth in chipping floor (No. 2/1970) in upper part of infilled shaft (No. 6) of flint mine at Saspow Site I, Olkusz Dist, 25km W of Cracow, Poland (50° 15' N, 19° 45' E). Coll 1970 and subm by J Lech, Inst Hist Material Culture, Warsaw. Sample assoc with pottery and flints belonging to late stage of Danubian culture (*cf* Lengyel III-V). *Comment:* date agrees with age expected (Lech, 1972; Dzieduszycka-Machnikowa & Lech, 1976) and with date of 5250 ± 90 for Shaft 4 at Saspow (GrN-7052C, unpub). For review of dates for flint mines, see Burleigh, 1975.

*H. Romania***BM-1124. Gornea****5871 ± 54** $\delta^{13}C = -25.8\%$

Charcoal (Ref 1974/57) from Vinča A culture site at Gornea, 10km SE of Moldova Nova, Caras-Severin Dist, Romania (44° 40' N, 21° 40' E). Coll 1974 and subm by R N L B Hubbard and J G Nandris, Inst Archaeol, Univ London. Charcoal fragments from Trench 23, Sq 1, Pit 21, Spits 4-6, separated by froth flotation and macerated with H₂O₂ to remove modern contaminants. Sample measured to provide date for beginning of Vinča culture, ca 4400 BC, for which few dates exist, and to test effectiveness of pretreatment procedure. *Comment* (JGN): mean of available dates for "earliest Vinča" material from Hungary and Yugoslavia is ca 4400 BC, some 450 radiocarbon yr earlier than BM-1124, but these are not all identical archaeol assemblages and sites extend over 650km; date for Gornea provides single determination for early but not necessarily earliest Vinča material from another regional sequence (Lazarovici, 1977).

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